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<b>14. ABSTRACT</b> The Information Placement and Retrieval through the Nationwide Health Information Network (InfoPRN) is a medical logistics research project being developed through the United States Army Telemedicine and Advanced Technology Research Center (TATRC). The InfoPRN projects goal is to ensure emergency planners / managers have timely access to the data necessary to optimize treatment of U.S. military / civilian personnel in the event of a mass casualty event in the U.S. The data includes availability of beds, medical personnel, medicines, and equipment / supplies at military and non-military treatment facilities. InfoPRN will result in a no-cost, open-source, software application enabling emergency planners / managers to do resource allocation prior to and during a mass casualty event.					
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## 1. Introduction

The **U.S. Army Medical Research and Materiel Command (USAMRMC or MRMC)**, is located at Fort. Detrick, MD and is the U.S. Army's medical materiel development command and its lead agency for medical R&D and acquisition; medical IM and IT; medical logistics management; and health facility planning.

The **Telemedicine & Advanced Technology Research Center (TATRC)** is located at the U.S. Army Medical Research & Materiel Command is located at Ft. Detrick, MD: is charged with researching *Advanced Military Medical Technologies* and is creating the future for military medicine by providing Medical IT solutions and simulation technologies. Among the stated goals, of the Telemedicine and Advanced Technology Program, is research focusing on practices and business processes which improve military medical logistics, including hospital services.

**TATRC** is the government agency responsible for managing and execution of congressional special interest programs, like this one Ultra Electronics, ProLogic Inc. has been contracted to develop a capability to electronically exchange medical logistics information through the Nationwide Health Information Network (NHIN). NHIN is an open source, service oriented architecture used to exchange Electronic Health Records (EHRs) and other patient data between authorized publishers and subscribers. There is no standard within NHIN to include medical logistics information as part of this exchange.

This annual report summary provides an in-depth description and a work to date on the Information Placement and Retrieval through NHIN (InfoPRN) software development project. ProLogic hypothesizes that emergency planners, emergency managers, disaster recovery coordinators and hospital resource managers could take advantage of this already-in-existence network to gather information for capacity planning prior to, and allocating medical resources during, a mass casualty event. The results of this project will determine whether medical logistics information can be exchanged through NHIN for use in emergency planning and management decisions.

Ultra Electronics, ProLogic's system will include a data model and standards for exchanging medical resource information over the open-source NHIN. The data model will include identification of all medical resource data elements required by emergency planners and managers, including their data type characteristics (ex: character, numeric, date), source of the data and destination of the data. The data model will be used to create a software program for exchanging these data elements between sources and destinations, using NHIN as the data transmission network. This software will include a data message format (standard) that this solution, and other to-be-developed or existing systems, can follow to transmit military medical logistics information over NHIN.

The Information Placement and Retrieval through the Nationwide Health Information Network (InfoPRN) is a congressionally funded medical logistics research project being developed through the United States Army Telemedicine and Advanced Technology Research Center (TATRC).

## **2. Body**

The Information Placement and Retrieval through the Nationwide Health Information Network (InfoPRN) is a medical logistics research project being developed through the United States Army Telemedicine and Advanced Technology Research Center (TATRC). The InfoPRN projects goal is to ensure emergency planners/managers have timely access to the data necessary to optimize treatment of U.S. military/civilian personnel in the event of a mass casualty event in the U.S. The data includes availability of beds, medical personnel, medicines, and equipment/supplies at military and non-military treatment facilities.

InfoPRN will result in a no-cost, open-source, software application enabling emergency planners/managers to do resource allocation prior to and during a mass casualty event.

### **Capabilities:**

- ❖ InfoPRN is a solution which can exchange and share medical resource information between private and public organizations supporting healthcare through the Nationwide Health Information Network (NHIN)
- ❖ InfoPRN aggregates categories of medical resource information into a common operational picture that improves situational awareness
- ❖ It presents innovative visualizations that support improved emergency planning and response by providing timely guidance for medical resource allocation decisions
- ❖ Responders can view current asset availability, including quantities and locations of various medical resources in an event-based manner
- ❖ InfoPRN Supports Disaster Management
  - Mass casualty event situational awareness
  - Real-time update of resource utilization
  - Same network and architecture as used for transferring Patient - Electronic Health Records (EHR)

### **Technical Approach:**

The technical approach of the project is to review existing specifications, use cases and data models for disaster preparedness logistic planning. Upon review of the program we will adopt/modify a data model and system software requirements for sharing medical logistic information within the NHIN. The project will investigate existing clinical and medical logistic systems in both the government and civilian sectors that could populate the proposed data model and build open source services to allow for potentially a bridge supporting cross communications and data sharing. The next step will to develop open-source software that will provide actual interfaces to in support of the new data model and surfacing system requirements to allow for medical logistics analysis and improved decision support for emergency disaster preparedness.

## ***Project Milestones Descriptions***

### **Milestone 1: InfoPRN Project Kick-Off**

An InfoPRN Project kick-off meeting was held on Monday, February 16, 2010 via teleconference between the Manassas, VA ULTRA ProLogic office and TATRC office location(s).

In attendance were the following participants:

LCDR Steve Steffensen (Navy) - COTR  
CAPT Emory Fry - SME  
John DePasquelle - TATRC PM Support  
Bob Connors - TATRC PM Support  
Col Roan - Army Defense Health Support Services which overseas (JMARS)  
Jennifer Tisch - Contractor and PM of JMARS  
Cyrus - a reservist at TATRC  
Mark Jeffries - TATRC and helps overseas the AHLTA (CDEs)  
Brian Cunningham - Principal Investigator & ULTRA ProLogic Program Manager

Kickoff meeting summary is as follows: Bob Connors led the meeting discussion, introduced everyone in attendance, and then gave a brief description of the program. The purpose for InfoPRN is to develop a prototype for the NHIN for providing Medical Logistics & Disaster Response capabilities. He stated that this is a congressional special interest project; therefore, he is looking for support from other parts of the DoD health care organization to make this a project success. The ultimate goal is to develop software so the medical logistics can be communicated between Federal and Civilian Medical communities.

The action items that resulted included the following:

- Mr. Cunningham will research AHIC use cases for disaster management.
- Dr. Steffensen will point Mr. Cunningham in the right direction with respect to AHIC, HITSP, DURSA, and FISMA.
- Dr. Steffensen will contact NMDS (Captain Bensic), JTF CapMed, and perhaps Kaiser Permanente to ascertain their interest in participating in this Congressional. May need to identify a civilian partner.
- Mr. Connors will work with Mr. Dempsey to MIPR \$200K to DHSS for engagement on the project to determine how JMARS's data might be integrated into the NHIN.
- A meeting has been scheduled April 6, 2010 for Mr. Cunningham will get demo of JMARS from Ms. Tisch.

## **Milestone 2: InfoPRN – High Level Schedule**

The scope of this document was to ensure all project activities, project stakeholders, critical project deliverables and milestones were defined and agreed upon. Therefore, the Integrated Master Schedule addressed and mapped out the following key areas of focus:

- Simplifying Project Assumptions
- Project Scope and taskings defined and approved
- Key stakeholders identified and allocated to tasks
- Project Milestones
- Key Deliverables
- Project Reporting

## **Milestone 3: 1<sup>st</sup> Quarterly Technical Progress Report (QTPR)**

The purpose of this milestone was ensuring regular and consistent reporting is being conducted. Quarterly Technical Progress Reports are the most immediate and direct contact between the Principal Investigator (PI) and the Contracting Officer's Representative (COR). The reports provide the means for keeping this Command advised of developments and problems as the contract effort proceeds. The quarterly reports also provide a measure against which decisions on release of funding and on requests for supplements are made.



InfoPRN - Quarterly  
Technical Progress Re

## **Milestone 4: System Requirements & TATRC Review**

The purpose of this milestone was to conduct Medical Logistics Research (including JMAR and NDMS) and complete a thorough review of the AHIC, DURSA, FISMA, HITSP, and CONNECT 3.x protocols and standards.

The following determinations were made during this process:

- InfoPRN is using the Emergency Data eXchange Language (EDXL) as a standard within the CONNECT Architecture
- InfoPRN is proceeding with a implementation of a proof of concept (to demonstrate in lieu of stakeholders) to showcase InfoPRN capabilities
- Coordination with HHS/ONC for the integration of Resource Management interoperability into CONNECT
- Brief TATRC with User Stories and development in lieu of stakeholders

### **Milestone 5: Detailed System Design Delivery & TATRC Review**

The purpose of this milestone was to review the newly created InfoPRN Detailed Design (Final), provide an updated high-level schedule for development effort and perform a TATRC project update / review. Key decisions as a result of this meeting were as follows:

- A contract modification was performed to establish the start date 1/27/2010. There were differences in the CDRL identification between the proposal and the contract. The Contracting
- Specialist provided clarification on the required deliverables via email on February 17, 2010. Accordingly, the final CDRL list is updated in the Milestones section above.
- An Initial Data Transfer Meeting needs to be conducted to discuss possible Data Feeds to support the Congressional Special Interest Project, Disaster Management/Medical Logistics Services for the Nationwide Health Information Network (NHIN).
- Interface and coordination with DMLSS has been initiated and \$200k has been MIPR'd for development and interface support.
- Discussions with Dr. Steve Steffensen & TATRC, about IRB compliance, is that there is NO HUMAN USE on this research project

### **Milestone 6: 2<sup>nd</sup> Quarterly Technical Progress Report (QTPR)**

The purpose of this milestone was ensuring regular and consistent reporting is being conducted. Quarterly Technical Progress Reports are the most immediate and direct contact between the Principal Investigator (PI) and the Contracting Officer's Representative (COR). The reports provide the means for keeping this Command advised of developments and problems as the contract effort proceeds. The quarterly reports also provide a measure against which decisions on release of funding and on requests for supplements are made.



InfoPRN - Quarterly  
Technical Progress Re

In the last reporting period (2nd Qtr), two instances of the NHIN CONNECT Gateway were installed, configured and validated: one 64-bit Windows Vista, and one Red Hat Enterprise Linux version. The reference implementations for clinical information sharing protocols supplied by the NHIN CONNECT team were deployed and validated. This provided the INFOPRN team with necessary inputs to begin definition of a medical logistics information exchange protocol that is envisioned and planned to be deployed on the CONNECT run-time infrastructure and in accordance with NHIN and CONNECT architecture and security standards and conventions.



We are proposing to use EDXL OASIS standard specifications to be the interoperable messaging standard for exchanging medical logistics information in both CONNECT and non-CONNECT system configurations and have been promoting this through our contracting agency, TATRC. Recently there has been much interest and high-level activity between DOD and HHS in delivering a proof of concept that demonstrates the utility of the CONNECT and EDXL combination.

## **Program Meetings Attended**

### **HHS Meeting to discuss Fusion Cell and the functionality of Med Map**

Completed APR 2010

An InfoPRN meeting was held with HHS on Friday, April 30, 2010.

HHS meeting summary is as follows: This meeting centered on existing JMARs capabilities and collaboration of Medical Logistics between DoD and HHS. The ultimate goal for InfoPRN is to develop software so the medical logistics can be communicated between Federal and Civilian Medical communities. Discussion centered HHS current development efforts on ASPR, OPEO, Fusion Cell and the functionality of MedMap.

A follow-up meeting was discussed to possibly learn more about HavBed and getting in touch with the HHS logistics arm in the near future. We were directed to follow-up Chuck Knell and Robert Shankman for this information. Meeting was adjourned.

### **JMAR NHIN Initial Data Transfer Meeting**

Completed July 2010

This Initial meeting was conducted to discuss possible Data Feeds to support the Congressional Special Interest Project, Disaster Management/Medical Logistics Services for the Nationwide Health Information Network (NHIN).

Meeting objectives were as follows:

- Initial meeting to discuss how JMAR might provide information to NHIN.
- Discuss strategy around defining a project to accomplish data transfer.
- Provide information about JMAR Web Services capabilities, and begin to discuss what JMAR currently has available as data.
- Establish follow-on initiatives/meetings.

It was noted that this initiative is focused on Research and Development (R&D) activities that may or may not come to full implementation. COL Roan indicated that JMAR is a tactical system with tactical results expected. The project will have to be structured as a set of activities that will yield an actual, run-able capability for it to be done by the JMAR contract. A need to Examine Functional and Technical requirements at a much lower level was expressed by all. Then with Government concurrence, JMAR can share designated data

using existing JMAR data. An Interface Control Document (ICD) will need to be established to modify the current web service. The current ICD should be considered in shaping of requirements.

A follow-on meeting was scheduled on Aug 9<sup>th</sup> to further discuss a phased approach. Below are some of the talking points that will be addressed during this meeting. Additionally, coordination will continue prior to this meeting to ensure these points can be addressed:

- Type of data sets required and how to aggregate the data
- Determine Milestones / Establish Timelines
- Integration of “Proof of Concept” plans into the JMAR Project Schedule and priorities
- Determine who the customer / user is
- Front end and dummy implementation for proof of concept
- Obtain concurrence from Government to proceed

Additional concerns, during this reporting period, focused on numerous project risks such as the lack of customer engagement and/or stakeholders’ involvement and JMARS schedule and resource availability to provide development support for InfoPRN which both could have a potential impact on specific software requirements and initial CONNECT capabilities.

The following determinations were made during this reporting period:

- There has been a decision to move forward with the Emergency Data eXchange Language (EDXL) as a standard within the CONNECT Architecture
- Coordination with HHS/ONC for the integration of Resource Management interoperability into CONNECT
- Continue to attempt to identify stakeholders
- Define tasks for JMARS development team

#### **Milestone 7: Annual Contractor Manpower Reporting (CMR) Deliverable**

The purpose of this milestone was ensure to that Ultra Electronics, ProLogic Inc. provides evidence of compliance with the CMR requirement to the COR, Contract Specialist, and Contracting Officer no later than 30 November of each calendar year that the contract is in effect.

#### **Milestone 8: 3<sup>rd</sup> Quarterly Technical Progress Report (QTPR)**

The purpose of this milestone was ensuring regular and consistent reporting is being conducted. Quarterly Technical Progress Reports are the most immediate and direct contact between the Principal Investigator (PI) and the Contracting Officer's Representative (COR). The reports provide the means for keeping this Command advised of developments and problems as the contract effort proceeds. The quarterly reports also provide a measure against which decisions on release of funding and on requests for supplements are made.



In the last reporting period (3rd Qtr), the following InfoPRN Team accomplishments have been completed:

- User Interface Mockup for the Visualization and Decision Support Components (Ready to demonstrate to potential stakeholders)
- Trades Studies for medical resource information visualization (Business Intelligence (B.I.) commercial product trade-offs, fully integrated map product support (dashboarding) in Jaspersoft vs. the (mash-up) integration required in Pentaho for reporting capabilities)
- Investigated Liferay (CAS dashboard capabilities)
- Proof of Concept EJB 3.0, JAXB and JAXWS for Resource Management Web Services hosted on NHIN CONNECT platform (LINUX , Glassfish)
- Settlement of JMARS project roles and responsibilities
- Review of VLER product architecture, especially Clinical data access services
- Held a meeting with NORTHCOM in Colorado Springs, Colorado (Emergency Coordinators) to secure Emergency Management SME expertise
- Installed & configured a virtualized “DEV” environment using Liferay 6.0 with Tomcat 5.2.3, MySQL Database, configured Liferay to operate against the MySQL Database, CAS (Central Authentication Service) as a Single Sign On framework and developed a custom authenticator to allow CAS to authenticate against the Liferay users

## **Program Meetings Attended**

### **JMAR NHIN Data Transfer Meetings**

Completed August 2010

InfoPRN project meetings were scheduled and conducted, during the month of August 2010, as a follow-up to the initial InfoPRN /JMARS meeting in Mid-July. These meetings discussed access to JMARS to support the Congressional Special Interest Project, Disaster Management/Medical Logistics Services for the Nationwide Health Information Network (NHIN).

Several follow-on meeting(s) were held to address the following InfoPRN issues:

- Type of data sets required
- How to aggregate the data
- Determine Milestones / Establish Timelines
- Integration Proof of concept plans into the JMARS Project Schedule and priorities
- Determine who the customer / user is
- Front end and dummy implementation for proof of concept
- Obtain concurrence from Government to proceed

The following items below were the final decisions resulting from Joint JMARS, TATRC and InfoPRN meetings as recorded in our InfoPRN meeting minutes:

- JMARS will furnish technical interface specifications and if needed technical expertise in using published web services
- InfoPRN will use stub implementations of JMARS Dynamic Query web services as a component of their effort
- InfoPRN will demonstrate interoperability of JMARS services with other agents sharing a very limited set of medical resource types (ex. PPE)
- Received WSDL from JMARS for InfoPRN reference Implementation usage

Meetings were concluded, with JMARS, upon request from the government.

### **TATRC Balsamiq Mockups & Development Review Meetings**

Completed December 2010

InfoPRN project meetings were conducted with Bob Connors and Dr. Steve Steffensen to introduce the InfoPRN Visualization and Decision Support component to determine which use case or feature will best drive an EDXL message conversation [over CONNECT]. These meetings were to attempt to receive feedback and comments from the government in support for InfoPRN - Congressional Special Interest Project, Disaster Management/Medical Logistics Services for the Nationwide Health Information Network (NHIN).

### **3. Key Research Accomplishments**

The key accomplishments that resulted from this project's scope of work to date" was the initial development of the reference implementation known as Information Placement and Retrieval through NHIN (InfoPRN) which allows for Medical Resource Information Exchange and a software development effort creating a Medical logistics "Common Operational Picture" (COP) which resulted in the ability to display a visualization of medical resources for emergency decision support:

- Specify a data standard
- Define services to provide and consume data
- Deploy services for existing NHIN stakeholders
- Use HHS ONC "Connect"
- Release as "Open Source"

Provided an InfoPRN demonstration on "Work to Date" on InfoPRN (Congressional Special Interest Project) for DHSS group and other interested parties, concerning the prototype medical logistics/disaster management/emergency response service on the NHIN, using EDXL data standard per TATRC's request on 4 February 2011.

Participated in the HIMSS Interoperability Showcase in Orlando, Florida, during the week of 20-24 February 2011, per TATRC's request showcasing InfoPRN with ONC/TATRC partners.

All project milestones have been met by schedule and on time.

#### **4. Conclusion**

In conclusion, there is approximately 90 days of research and development left on the reference implementation for Medical Resource Information Exchange known as Information Placement and Retrieval through NHIN (InfoPRN). It is the projects goal to attract the necessary or newly directed stakeholders to conduct a pilot, using InfoPRN, to show the value of Medical Resource or Logistics Information Exchange and its data sharing capabilities.

Several software development iterations (CLINs) are still to be completed which will address numerous web services functions or potential Enterprise Service Bus" (ESB) capabilities which further define InfoPRN's available services to provide the functionality to provide and consume data on the NHIN or a trusted network using HHS ONC Connect 3.x. or other stakeholder determined communication protocols.

InfoPRN is looking to implement a proof of implementation based on expressed interests from several recently identified potential stakeholders after attending the HIMSS11 Conference in Orlando, Florida. The following near-term opportunities have presented themselves and we are diligently working to follow-up on requests for demonstrations and additional capabilities information.

##### **1. Veteran Affairs National Suicide Prevention**

POCs: Dr. Doug Rosendale (VA) - Enterprise System Manager for Joint Interoperability Ventures, Gregory Dunham (VA) and Robert Stevenson (HHS)

##### **2. Emergency Response and Coordination for Optometrists**

POC: Helen A. White: DoD/VA Vision Center of Excellence Director, Informatics; Info Mgmt

There are several remaining project deliverables for Information Placement and Retrieval through NHIN (InfoPRN) these include the following as contracted by the Telemedicine and Advanced Technology Research Center (TATRC):

- InfoPRN Product Baseline, build and deployment scripts, configuration files, source code and all documented Software Test Results (CDRL, A0006, A0008)
- TATRC Programmatic Line Review (PLR) scheduled for 15 March 2011
- System Install "Demo" in Stakeholders Environment (CDRL, A0009, A0010)
- Deliver "Final" Report and System

## 5. Reportable Outcomes

ULTRA ProLogic will deliver, to TATRC, a reference implementation known as Information Placement and Retrieval through NHIN (InfoPRN) which allows for Medical Resource Information Exchange and a Common Operational Picture (COP) displaying a visualization of medical resources for emergency decision support.

The key outcomes from the InfoPRN project's research will be as follows:

- Open-source solution enabling emergency planners and managers to allocate medical resources
- Improvement feedback to OASIS EDXL (NIEM) standards
- Policy recommendations needed to exchange information and commit medical resources electronically
- Attract the necessary stakeholders to conduct a pilot, via InfoPRN, to show the value of Medical Resource or Logistics Information Exchange and its data sharing capabilities
- Ensures that emergency responders have timely access to information necessary to treat both military and civilian personnel during a mass casualty event
- Information includes availability of facilities, capacities of medical services and resources
- NHIN provides its stakeholders the ability to share EHR information; InfoPRN can do same for medical resource information
- Resources coordinated across parties crossing jurisdictional, organizational, etc. "boundaries"

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## **7. Appendices**

### **Appendix – A (Acronyms and Definitions)**

AHIC	American Health Information Community
COP	Common Operational Picture
DURSA	Data Use and Reciprocal Support Agreement
DMLSS	Defense Medical Logistics Standard Support
EDXL	Emergency Data Exchange Language
EHR	Electronic Health Records
FISMA	Federal Information Security Management Act
HHS	US Department of Health Human Services
HITSP	Healthcare Information Technology Standards Panel
InfoPRN	Information Placement and Retrieval through NHIN
JMAR	Joint Medical Asset Repository
NMDS	National Disaster Medical System
NHIN	Nationwide Health Information Network
OASIS	Organization for the Advancement of Structured Information Standards
QTPR	Quarterly Technical Progress Report
SME	Subject Matter Expert
TATRC	Telemedicine & Advanced Technology Research Center
UI	User Interface
USAMRMC	U.S. Army Medical Research and Material Command



## **Appendix – B (InfoPRN) Project Team Members**

### **Ultra Electronics, ProLogic, Inc. – Manassas, Virginia (Prime Contractor)**

Brian Cunningham - Principal Investigator (PI)

[brian.cunningham@ultra-prologic.com](mailto:brian.cunningham@ultra-prologic.com)

Office Phone: 703-331-5853

Bryon Rollins – Subject Matter Expert / Program Manager (PM)

[bryon.rollins@ultra-prologic.com](mailto:bryon.rollins@ultra-prologic.com)

Office Phone: (703) 335-2315

Steve Dearborn - Technical Lead

[steve.dearborn@ultra-prologic.com](mailto:steve.dearborn@ultra-prologic.com)

Office Phone: (703) 335-9869

Doug Brown – Software Developer

[doug.brown@ultra-prologic.com](mailto:doug.brown@ultra-prologic.com)

Office Phone: 304-333-2680 x301

Joseph Catalino – Logistics SME

[joe.catalino@ultra-prologic.com](mailto:joe.catalino@ultra-prologic.com)

Office Phone: (703) 335-9869

### **Fountainhead - (Subcontractor)**

Steve Andrews – Senior Software Developer / President

[steve@fountainhead.us.com](mailto:steve@fountainhead.us.com)

Office Phone: 703.628.5890

Nate Oster – Senior Software Developer / Tester

[nate.oster@fountainhead.us.com](mailto:nate.oster@fountainhead.us.com)

Office Phone: 703.930.4100

### **TATRC - Fort Detrick, Maryland – (Contracting Awarding Office)**

Mr. John DePasquale, IPA.

Medical Logistics Portfolio Manager, Simulation & Training Technology (TATRC)

[depasquale@tatrc.org](mailto:depasquale@tatrc.org)

Office Phone: (301) 619-3693

Crystal Ferrell - Project Officer - Macaulay Brown, Inc.

TATRC, USAMRMC, MCMR-TT

[crystal.ferrell@tatrc.org](mailto:crystal.ferrell@tatrc.org)

Office Phone: (301) 619-7938